

Claims:

1. A method of compensating for path losses for data transmissions in the upstream direction for a tree and branch network having at least two remote modems, the method comprising:

- 5 a) establishing a target level for received signal strength of upstream data transmissions received by a central modem;
- b) measuring the received signal strength of a first upstream data transmission from a first remote modem with the first unique identification value;
- c) providing feedback to the first remote modem regarding the received signal
10 strength of the first upstream data transmission to the central modem from the first remote modem;
- d) responding to the feedback by adjusting the output level of the first remote modem to attempt to adjust the received signal strength of a second upstream data transmission from the first remote modem to the central modem towards the target
15 level;
- e) measuring the received signal strength of the second upstream data transmission from the first remote modem with the first unique identification value;
- f) providing feedback to the first remote modem regarding the received signal
20 strength of the second upstream data transmission to the central modem from the first remote modem; and
- g) responding to the feedback by adjusting the output level of the first remote modem to attempt to adjust the received signal strength of a third upstream data transmission from the first remote modem to the central modem towards the target
25 level.

2. The method of claim 1 wherein each step of providing feedback further includes:
- a) comparing the measured signal strength with the target signal strength; and
 - b) sending data of a first type to the first remote modem if the signal strength of the previous data transmission to the central modem was above the target level and
30 sending data of a second type to the first remote modem if the signal strength of the previous data transmission to the central modem was below the target level.

3. The method of 2 wherein each step of responding to the feedback comprises adjusting the output level of the first remote modem by a first amount in response to feedback indicating that the received signal strength needs to increase, and adjusting the output level of the first remote modem by a second amount in response to feedback
5 indicating that the received signal strength needs to decrease.
4. The method of claim 1 wherein the feedback to the first remote modem is provided with a downstream data transmission addressed to the first remote modem.
- 10 5. A client modem for use in a passive multipoint distribution network wherein the client modem is adapted to:
- a) transmit data upstream along the distribution network to an central modem;
 - b) receive data transmitted downstream from the central modem;
 - c) determine if the transmitted data is addressed to the client modem; and
 - 15 d) respond to control data sent with the transmitted data addressed to the client modem to adjust the output level of the next transmission of data upstream to the central modem.
6. The method of claim 1 wherein the method further comprises:
- 20 h) measuring the received signal strength of the each subsequent upstream data transmission from the first remote modem with the first unique identification value;
 - i) providing feedback to the first remote modem regarding the received signal strength of the each subsequent upstream data transmission to the central modem
25 from the first remote modem; and
 - j) responding to the feedback by adjusting the output level of the first remote modem to attempt to adjust the received signal strength of a next upstream data transmission from the first remote modem to the central modem towards the target level.
- 30

7. The client modem of claim 6 wherein the client modem is further adapted to compensate for loss variations in the downstream direction through use of an automatic gain control function contained within the client modem such that the client modem operates one loss compensation system for downstream transmissions and one loss compensation system for upstream transmissions.

8. The client modem of claim 6 wherein the client modem is:

- a) adapted to be connected to a coax television receptacle on the upstream side of the client modem;
- 10 b) adapted to pass to a downstream coax cable a band of frequencies containing at least one cable television channels;
- c) adapted to pass data from the central modem that is addressed to the client modem to a downstream data cable;
- d) adapted to receive data from the downstream data cable; and
- 15 e) adapted to transmit upstream the received data from the downstream data cable in response to a polling signal from the central modem providing permission for that particular client modem to conduct an upstream transmission.

9. The client modem of claim 6 wherein the client modem includes an infrared transceiver for communication with a similarly equipped device.

10. The client modem of claim 6 wherein the client modem is:

- a) adapted to pass data from the central modem that is addressed to the client modem to a downstream data cable wherein the downstream data cable has at least two downstream connectors that allow the downstream data cable to form a communication link with a first computer at a first time through one type of communication connection and with a second computer at a second time through a second type of communication connection;
- 25 b) adapted to receive data from the downstream data cable; and

- c) adapted to transmit upstream the received data from the downstream data cable in response to a polling signal from the central modem providing permission for that particular client modem to conduct an upstream transmission.

5 11. The client modem of claim 9 wherein communication connection is selected from the group consisting of serial connection, parallel connection, and USB connection.

12. A communication hub with a data path for use at the upstream end of a tree and branch distribution network using an internal data communication protocol with at least
10 two remote modems, the communication hub located between the tree and branch distribution network and at least one central modem in connection with an external network using an external data communications protocol using IP addresses, the external data communications protocol different from the internal data communications protocol, the hub comprising:

- 15 a) a connection port for connection to the tree and branch distribution network to allow the hub data path to receive data transmissions from at least two remote modems;
- b) a connection port for connection to at least one central modem connected to the external network;
- 20 c) a measurement circuit to measure the signal strength of a data transmission from a remote modem;
- d) a means to receive downstream data transmissions from at least one central modem directed to one of the at least two remote modems;
- e) a means to transmit downstream data transmissions with addressing information
25 that allows the particular modem to identify the downstream data transmission as uniquely addressed to the particular modem;
- f) a protocol converter adapted to route communications between the at least two remote modems and a smaller number of at least one central modem; and
- g) a means to provide signal strength feedback to the particular remote modem to
30 allow the remote modem to adjust the signal strength sent by the particular modem.

13. The communications hub of claim 12 wherein the hub further comprises:

An RF Modem at the downstream portion of the hub data path; and

A Network Interface unit at the upstream portion of the hub data path;

And wherein the protocol converter

5 a) connects the RF Modem and the Network Interface unit so that upstream communications received by the hub from the at least two remote modems are passed through the RF Modem, converted by the protocol converter from the internal protocol to the external protocol, and then passed to the Network Interface unit before travel to one of the at least one central modem for transmission onto the
10 external network; and

b) connects the Network Interface unit and the RF Modem so that downstream communications targeted for the particular remote modem are received by the Network Interface unit and converted from the external protocol to the internal protocol to be sent to a targeted remote modem out of the at least two remote
15 modems.

14. The communications hub of claim 13 wherein the hub receives data communications from the at least one central modem is a 10baseT protocol and the protocol received from the at least two remote modems is a Point-to-Point protocol.
20

15. The communications hub of claim 13 wherein the means to provide signal strength feedback to the particular remote modem includes:

a) setting a target level for signal strength for upstream data communications received by the hub from the at least one remote modems;
25 b) comparing the measured signal strength with the target signal strength for an upstream data communication from a particular remote modem; and
c) sending a downstream data transmission directed to the particular remote modem accompanied by data from the hub indicating whether the signal strength of the previous upstream data transmission to the hub modem was above the target level.

30

16. The communications hub of claim 13 wherein the means to provide signal strength feedback to the particular remote modem includes:

- a) setting a target level for signal strength for upstream data communications received by the hub from the at least one remote modems;
- 5 b) comparing the measured signal strength with the a target signal strength for an upstream data communication from a particular remote modem; and
- c) sending a downstream data transmission directed to the particular remote modem accompanied by data from the hub indicating whether the signal strength of the previous upstream data transmission to the hub modem was below the target level.

17. The communications hub of claim 13 wherein the means to provide signal strength feedback to the particular remote modem includes:

- a) setting a target level for signal strength for upstream data communications received by the hub from the at least one remote modems;
- 15 b) comparing the measured signal strength with the a target signal strength for an upstream data communication from a particular remote modem; and
- c) sending a downstream data transmission directed to the particular remote modem with accompanied by a request from the hub to alter the transmission strength of upstream data transmission from the particular remote modem by a fixed amount
- 20 based on the result of the most recent comparison of the measured signal strength with the target signal strength for the upstream data communication from the particular remote modem.

18. An internal communication network incorporating a cable television tree and branch network, the internal communications network comprising:

- a) A first joiner device with an upstream connection to an external network, a first downstream connection and a second downstream connection;
- b) A second joiner device with a first upstream connection, a second upstream connection and a downstream connection;
- 30 c) A TV path connecting the first downstream connection of the first joiner device to the first upstream connection of the second joiner device;

- d) The TV channel amplifier connected as part of the TV path;
- e) A bypass path around the TV channel amplifier, the bypass path starting at the second downstream connection of the first joiner device and ending at the second upstream connection of the second joiner device;
- 5 f) The bypass path including a communication hub and a cable modem upstream of the communication hub;
- g) The communication hub including: a RF modem, a protocol converter, and a Network Interface unit;
- h) The RF modem in communication with the data path to send and receive data
10 transmissions through the second joiner device, the data transmissions in an internal communication protocol;
- i) The Network Interface unit in communication with the cable modem using an external communication protocol;
- j) The downstream connection of the second joiner device in communication with a
15 tree and branch distribution system connected to at least two remote modems;
- k) The communication hub serving as a proxy server to link the at least two remote modems to the cable modem;
- l) The communication hub sending a downstream data communication to a particular remote modem comprising data for the particular remote modem received from the
20 central modem after protocol conversion to internal communication protocol and signal strength feedback to indicate to the particular remote modem whether the last upstream communication from that particular remote modem received by the RF modem was below the target level for signal strength.